

Claims

1. A system for colour matching an object comprising:
 - (i) means for taking a coloured image of an object;
 - 5 (ii) means for relaying the coloured image to a place remote from a location where the image of the object was taken;
 - (iii) means for analysing colour values of the image; and
 - (iv) means for converting the colour values into parameters from which the original colour of the object can be reconstituted.
- 10 2. A system according to Claim 1 wherein the means for taking a coloured image of the object is a camera.
3. A system according to Claim 2 wherein the means for taking a coloured
15 image of the object is a digital camera.
4. A system according to either Claim 2 or 3 wherein the camera is provided with cross-polarised filtration so as to produce a cross-polarised image.
- 20 5. A system according to any one of Claims 2-4 wherein the camera is pre-set and/or pre-programmed to a specified focal length.
6. A system according to Claim 5 wherein the focal length is 25 ± 2 cm.
- 25 7. A system according to any preceding claim further including a camera housing assembly for supporting the camera.
8. A system according to claim 7 wherein the camera housing assembly is provided with a light source for illuminating the object.

30

9. A system according to claim 8 wherein light is transmitted to the camera housing assembly via a fibre optic cable.

10. A system according to either claim 8 or 9 wherein the light source comprises a plurality of light spots.

11. A system according to claim 10 wherein the light spots are arranged in a ring.

12. A system according to any one of claims 7 to 11 wherein the camera housing assembly further comprises a telescopic member for preventing incidental light entering an image field of shot.

13. A system according to claim 12 wherein the telescopic member comprises a tube comprising two independently extendible longitudinal tube halves whose longitudinal edges slidingly engage and which may be adjusted so that, in use, and when extended, the tube can be made to approximately conform to the shape of curved objects and to rest thereagainst by extending one half of the tube more than the other half.

14. A system according to either claim 12 or 13 wherein the telescopic member, in use, is extended prior to taking an image and is retracted when not in use.

15. A system according to any one of claims 7 to 14 wherein the camera housing assembly further comprises means for assessing distance between the camera and the object to be imaged.

16. A system according to claim 15 wherein the means for assessing distance comprises a mutually perpendicular cross-hair arrangement.

17. A system according to claim 15 wherein the means for assessing distance comprises a pair of right and left light beams or lasers.

18. A system according to any preceding claim further including a reference colour indicator placed in close proximity to the object or associated with the means for taking a coloured image of an object so that the captured image contains a reference colour.

19. A system according to Claim 18 wherein the reference colour is grey.

20. A system according to claim 19 wherein the grey is cool grey C pantone number 8.

21. A system according to any one of claims 18 to 20 wherein the reference colour indicator comprises a substantially U or L shaped block or a sheet or paper.

22. A system according to any preceding claim wherein the means for relaying the captured image to a place remote from a location where the image was captured is an electronic communication means.

23. A system according to Claim 22 wherein the electronic communication means is an Internet connection, a dedicated telephone line or a data carrier.

24. A system according to Claim 23 wherein in the instance of relaying image data via the Internet data is encrypted so that whilst it is in the public domain or "on air" it is in a form that cannot be accessed by the public.

25. A system according to Claim 4 or any claim depending therefrom, wherein the means for analysing the colour values is a computer software program which is capable of converting the cross-polarised image of the original object into a plurality of colour components.

26. A system according to any preceding claim wherein the colour values of the captured image of the original object colour are represented by intensities of red, blue and green colour components.

5 27. A system according to any preceding claim when used in colour matching a natural tooth or set of teeth so that a dental prosthesis can be constructed to match the natural tooth of a patient.

28. A system for identifying colour components of an object comprising:

- 10 (i) means for taking a coloured image of an object;
- (ii) means for relaying the coloured image to a place, optionally remote from a location where the image of the object was taken;
- (iii) means for analysing colour values of the image; and
- 15 (iv) means for converting the colour values into parameters so as to compare or record the colour values against a reference set.

29. A system according to claim 28 further including any one or more of the features recited in claims 2 to 26.

20 30. A method of colour matching an object comprising the steps of:

- (i) capturing a coloured image of the object;
- (ii) relaying the captured image to a place remote from the object;
- (iii) analysing colour values from the captured image; and
- 25 (iv) converting the colour values from the captured image into parameters from which the original colour of the object can be reconstituted.

31. A method according to Claim 30 wherein the object is illuminated with a supply of known light at a specified distance therefrom prior to step (i).

30 32. A method according to either claim 30 or 31 further including the step of reducing/preventing incidental light from entering a field of shot.

33. A method according to any one of claims 30 to 32 further including the step of including a reference colour indicator with the captured image.

34. A method according to Claim 33 wherein the reference colour indicator is of known red, green and blue values, so that when the colours of the captured image are analysed, the reference colour is located in the captured image and red, green and blue values of the whole captured image are corrected relative to the reference colour.

35. A method according to any one of Claims 30 to 34 further including the step of relaying the colour values back to a location where the original image was captured so that a comparison can be made between the colour of the original object and that of the reconstituted colour image.

36. A method according to any one of Claims 30 to 35 wherein a VDU is provided at the place where the image was captured and/or where the captured image is relayed for analysis is provided with software for correcting reference colour red, green and blue values on the monitor/screen so that a displayed image on the VDU is colour corrected with respect to the reference colour.

37. A method according to any one of Claims 30 to 36 further including the step of committing to memory or storing a colour recipe in a central data bank.

38. A method according to any one of claims 30 to 37 further including any one or more of the features recited in claims 2 to 26.

39. A method according to any one of Claims 30 to 38 when used in colour matching a natural tooth or set of teeth with a dental prosthesis.

40. A method according to Claim 39 wherein when taking the image of a patient's natural tooth/teeth *in situ*, the camera is positioned a predetermined distance from a skeletal reference point on a patient's skull.

41. A method according to Claim 40 wherein the camera is positioned from 15-25 cm inclusive from the skeletal reference point.

5 42. A method according to either Claim 40 or 41 wherein the skeletal reference point is at the bridge of the patient's nose or nap of his/her chin, the nap being formed at the junction of the lower jaw and bottom set of teeth.

10 43. A method according to any one of claims 39 to 42 wherein the camera position with respect to the patient is monitored by aligning horizontal and vertical cross hairs or by a common point when left and right light beams or lasers coincide.

44. A method of identifying colour parameters of an object comprising the steps of:

- 15 (i) capturing a coloured image of the object;
- (ii) relaying the captured image to a place, optionally remote from the object;
- (iii) analysing colour values from the captured image; and
- 20 (iv) converting the colour values from the captured image into parameters so as to compare them to a reference set and/or to record individual characteristic colour values.

45. A method according to claim 44 further including any one or more of the features recited in claims 31 to 38.

25

46. Use of the system according to any one of Claims 1 to 26 when used for colour matching of textiles, paints, dyes, car body parts, cosmetics, hair dyes, skin preparations and pigments in picture restoration.

47. Use of the system according to any one of claims 28 to 30 when used to identify colour parameters of precious metals, gems and stones, currency notes, identity pictures/photographs and batch colouring processes.
- 5 48. Use of the method according to any one of Claims 30 to 38 when used for colour matching of textiles, paints, dyes, car body parts, pigments in picture restoration and cosmetics.
49. Use of the method according to either claim 44 or 45 when used for
10 identifying colour parameters of metals, gems and stones, currency notes, identity pictures/photographs and batch colouring processes.
50. Use of the system according to any one of Claims 1 to 27 when used for the colour matching of a natural tooth to a dental prosthesis.
15
51. Use of the method according to any one of Claims 30 to 43 when used for the colour matching of a natural tooth to a dental prosthesis.
52. Use of a system according to any one of Claims 1 to 26 when used for
20 capturing images of a part of a body and relaying this information to a health care professional remote from a patient so that a diagnosis can be made without the patient needing to be physically present.
- 53 Use of a method according to any one of Claims 30 to 43 when used for
25 capturing images of a part of a body and relaying this information to a health care professional remote from a patient so that a diagnosis can be made without the patient needing to be physically present.
54. Use of a system and/or method according to either of Claims 52 or 53 when
30 used for diagnosing dermatological lesions and other such conditions where the physical appearance and colour of an organ is a relevant diagnostic factor.

55. A dental prosthesis product produced by the method according to any one of Claims 30 to 43

5 56. A method of making a dental prosthesis using the system according to any one of claims 1 to 26 comprising the steps of:

- (iv) determining shade variations within a tooth;
- (v) replicating the shade variations in a prosthesis by selecting a match
from a predetermined range of ceramics colours for individual areas of
the tooth; and
- (vi) constructing a prosthesis by painting or otherwise applying different
shades of ceramics to a base prosthesis so as to match the colour
variations in the tooth.

10

15